

Presenting the Facts About Smoking to Adolescents

Effects of an Autonomy-Supportive Style

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Objectives: To test the self-determination model of health-related behavior by examining whether the degree to which adolescents experience an appeal to not smoke as autonomy supportive would affect their autonomous motivation for not smoking and, in turn, their behavior of either refraining from smoking or smoking less, and to validate the measures of perceived autonomy support and autonomous motivation for not smoking.

Design: Two studies of physicians presenting information about not smoking using 2 message styles, 1 of which was designed to be more autonomy supportive. The preliminary study involved nonrandomized assignment to message style and only immediate assessment of perceptions, motivation, and behavior, while the primary study involved randomized assignment and 4-month longitudinal assessments.

Setting and Participants: Nearly 400 ninth- through 12th-grade students at 2 suburban high schools in upstate New York.

Main Outcome Measures: Adolescents' perceptions of the presentations' autonomy supportiveness of the pre-

senters, as well as adolescents' autonomous motivation for not smoking and their self-reports of smoking. The primary study also assessed change in students' autonomous motivation and change in their self-reported smoking during 4 months.

Results: In both studies, the measures were reliable and valid. Students perceived significantly ($P = .04$ and $P < .001$, respectively) greater autonomy support in the "It's Your Choice" presentation, after controlling for whether the students were smokers. Perceived autonomy supportiveness of the presentation was positively correlated with autonomous reasons for not smoking in the preliminary study and with increases in autonomous motivation for not smoking in the primary study. Change in autonomous reasons for not smoking significantly ($P < .001$) predicted reduction in smoking during 4 months.

Conclusion: When adolescents perceived messages about not smoking as autonomy supportive, they had more autonomous motivation for not smoking, and that, in turn, predicted a decrease in their self-reports of smoking.

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Editor's Note: With adolescents (and probably most everyone else), the style of presentation is at least as important as the message.

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TOBACCO USE is the single largest cause of death in our society.¹ Because tobacco use is an acquired behavior, it is preventable, as are the morbidity and mortality associated with it. The initiation of smoking is an issue of primary concern in adolescence, as 90% of those who become long-term smokers start smoking regularly before the age of 20 years.² Because half of all long-term smokers die prematurely from smoking, not starting or quitting during adolescence substantially reduces the risk of dying prematurely.^{2,3}

Because of the impact of tobacco use on morbidity and mortality, enormous efforts have been made to prevent smoking or to encourage cessation, particularly among adolescents. Since the 1960s, considerable research has focused on how to prevent smoking among teenagers, although little research attention has been directed toward how to foster cessation among those who already smoke.² The present studies, which involved physicians making presentations about smoking to students attending 2 high schools, did not select students based on their smoking status, so it has relevance to the issues of prevention and cessation.

As part of the effort to discourage smoking among teenagers, physicians and other health care workers are frequently asked to make presentations about tobacco use to high school students, and packaged slide sets and accompanying discussion materials are

MATERIALS AND METHODS

INTERVENTIONS

Two 20-minute interventions were constructed from smoking-related information. In the preliminary study, a male physician (G.C.W.) presented both interventions to high school students, 1 each in 2 consecutive class meetings; and in the primary study, a male physician (G.C.W.) presented half and a female physician (E.M.C.) presented the other half. Each presentation consisted of a series of slides (13 in the preliminary study and 14 in the primary study) and advised the students not to smoke. Three of the slides were the same in the 2 presentations: the first reported that 90% of smokers start as teenagers; the second presented the immediate health risks for adolescent smokers, namely, increased cough and phlegm production, poorer physical fitness and lung development, and increased respiratory infections; and the third outlined the health benefits of quitting. The 10 remaining slides in the 2 interventions differed according to the themes described below.

TYPICAL "FEAR-AND-DEMAND" PRESENTATION

In this intervention, the 10 slides had a theme of disease and death caused by smoking and were intended to emphasize graphically the grave consequences of smoking. Examples included the following: (1) One slide that indicated that of the 3000 adolescents who would start smoking that day, 20 will be murdered, 30 will die of injuries from motor vehicle crashes, and 750 will be killed from tobacco use. (2) One slide that showed an autopsy specimen of a lung riddled with cancer from a person who died from lung cancer. (3) One slide titled "The Cigarette Death Epidemic in Perspective," which showed comparisons, per annum, of the number of Americans who die from cocaine or heroin use; who are murdered; who died from action during the Vietnam War and World War II; and who die from smoking. The last number, being more than 400 000 deaths per year, was, of course, far greater than any of the others. While reviewing these slides, the presenter maintained a continued emphasis that the teenagers should not start smoking and that, if they do, they should quit immediately.

"IT'S YOUR CHOICE" PRESENTATION

In addition to the 3 slides common to both presentations, the slides in this intervention contained a theme emphasizing the seductive nature of the tobacco industry's advertising and the addictive nature of nicotine, both of which can function to subjugate adolescents' choice to not smoke. Three slides showed advertisements; 1 reported that the tobacco industry spends \$4 billion per year to attract new smokers; and 4 presented information about nicotine's addictive qualities by describing the withdrawal symptoms that teenagers go through when trying to quit, illustrating that of every 100 high school student smokers, 53 have tried unsuccessfully to quit and 95 say they will quit within 5 years of graduation but only 25 succeed. The presenter emphasized that whether a person smokes is an important adult decision that all teenagers must make for themselves, and

that, because of the tobacco industry's enormous efforts to hook them, they need to be careful about making that decision. The presenter also emphasized the addictive nature of nicotine, noting that once teenagers have begun to smoke, their sense of choice about whether to continue smoking is likely to be greatly reduced.

QUESTIONNAIRES

Participants were informed that the short questionnaire packet was entirely voluntary and confidential. By signing and returning a detached cover sheet, they gave informed consent for their participation. In addition to demographic variables, which were slightly different in the 2 studies, and smoking status (whether they had smoked at least 100 cigarettes in their lives), the participants responded to items that formed the adapted TSRQ, which assessed their autonomous motivation for not smoking, and the adapted Health Care Climate Questionnaire, which assessed their perceptions of the presenter's autonomy support. These scales were used in the preliminary and primary studies, so these studies were in part intended to validate the adapted instruments.

The TSRQ items were worded in 2 forms: reasons why the smokers would quit, and reasons why the nonsmokers would not start. Participants used 7-point Likert-type scales to respond to 5 items with the wording dependent on whether they smoke. Their autonomous motivation score was the sum of their responses on the 5 items. An example for the smokers is, "The reason I would quit smoking is that not smoking is a choice I really want to make for myself," and for the nonsmokers is, "The reason I do not smoke is that not smoking is a choice I really want to make for myself." The Cronbach α reliability was .89 in the preliminary study and .88 in the primary study.

This adapted form of the Health Care Climate Questionnaire consisted of 4 items answered on 7-point Likert-type scales. The perceived autonomy score was the sum of students' responses on the 4 items. An example item was, "The presenter felt smoking, or not, was a choice that was up to me to make." The α for this scale was .75 in the preliminary study and .72 in the primary study.

Students in the primary study were also given 2 questions about their smoking behavior taken from the Youth Risk Behavior Surveillance System Survey.¹² Given a few days before the presentations and then again 4 months later, these questions were the basis for an important dependent variable in that study.

ANALYSES

Analyses first involved comparing the students who heard the 2 different presentations on all study variables using *t* tests and χ^2 analyses. Then, multiple regressions were performed to test for the effects of the intervention and for perceived autonomy supportiveness. In the first study, regression analyses predicted autonomous motivation for not smoking; and in the second study, regression analyses predicted changes during the 4-month period in autonomous motivation for not smoking and in students' smoking behavior. In each case, using procedures recommended by Cohen and Cohen,¹³ the dependent variable of interest was regressed onto its baseline before entering the predictor variables.

available commercially from which to make such presentations.⁴ The present studies involved the use of those materials and were concerned with whether the way in which students perceived the style of the physicians presenting the information about smoking would affect their smoking-related motivation and behavior.

In our experience, many physicians who are asked to present information to adolescents about not smoking design their presentations to scare the adolescents by highlighting photographs of cancer-riddled organs or emphysematous lungs and by emphasizing statistics about how many people experience disease and death because of smoking. During their presentations, physicians frequently direct or command the teenagers to refrain from or cease smoking with the assumption that their status and authority as medical experts will lead the teenagers to comply.

This approach of highlighting frightening information is consistent with the information deficit model that guided much of the smoking prevention research in the 1960s and 1970s. There is virtually no evidence to indicate that this approach is effective in influencing teenagers' smoking behavior,² yet the approach still seems to be in quite common use among physicians. It, therefore, seemed to represent an appropriate baseline against which to compare the new approach based on self-determination theory.⁵

Self-determination theory, which is an empirically based theory of human motivation, suggests that the use of a controlling, directive, authoritarian approach to communicating may be counterproductive. Specifically, the theory proposes that communicating in an attempt to encourage self-initiation rather than compliance is likely to have a more positive effect on motivation and behavior. The theory focuses on a particular type of motivation, namely, autonomous motivation, and emphasizes that a person's degree of autonomous motivation (in contrast to controlled motivation) will positively predict maintained behavior change and positive health outcomes. A behavior such as not smoking is autonomous to the extent that people do it with a full sense of choice and volition because of their belief in its personal importance for them. In contrast, it is controlled to the extent that people do it because they feel pressured or coerced.

The present studies assessed autonomous motivation for not smoking with an adaptation of the Treatment Self-Regulation Questionnaire (TSRQ). Previous research using variants of this questionnaire has found autonomous regulation to be positively associated with active participation in an alcohol treatment program,⁶ long-term maintenance of weight loss and exercise,⁷ maintenance of smoking cessation in adults,^{8,9} adherence to long-term medications,¹⁰ and better glucose control for patients with diabetes.¹¹ Also, as predicted by self-determination theory, these studies showed that autonomous motivation was enhanced by health care providers who were autonomy supportive.

"Autonomy support" refers to an interpersonal style in which authority figures such as physicians take others' perspectives into account when providing relevant information, offer choice and minimize pressure, and encourage others to accept more responsibility for their own behavior. This orientation involves minimizing the use of pressure and demand so the others will experience a

greater sense of choice and initiation of their own actions. The theory predicts that, in general, the degree to which adolescents experience the message as autonomy supportive will positively predict their level of autonomous motivation and their nonsmoking.

The self-determination approach to smoking prevention and reduction assumes that communications that are experienced by teenagers as pressuring them will tend to orient them toward an authority struggle and will thus interfere with their autonomous consideration about whether it is in their own best interest to smoke. None of the previous approaches to smoking prevention or cessation have used this perspective, although there are some shared elements between our approach and the affective education model.² Specifically, we too believe that a consideration of affective factors is important; however, our approach assumes that greater feelings of self-worth and motivation for change will come about not through focusing on changing the teenagers' attitudes, values, and perceptions of self-worth, *per se*, but rather by working from their perspective regarding smoking and encouraging them to think about the issues and to make their own choice about how to behave.

Perceived autonomy support of the presenter was measured with an adaptation of the Health Care Climate Questionnaire,⁷ which focused on adolescents' experience of the degree to which the physician's message about not smoking was acknowledging or accepting of their perspectives and feelings and allowed them to feel a sense of choice about smoking-related behaviors.

The present studies were designed first to test the general prediction that the autonomy-supportive approach would be more effective than the controlling approach for promoting autonomous motivation and a lower rate of smoking, and, second, to validate the adapted instruments for assessing the perceived autonomy supportiveness of smoking-related messages and individuals' autonomous motivation for not smoking.

In these studies, 2 communications were designed to advise high school students not to smoke. The first involved fear and demand by emphasizing that people should refrain from smoking to prevent the horrible diseases so graphically displayed in the accompanying slides. The second, informed by self-determination theory, emphasized that smoking is a matter of choice but that there are important health-related reasons for refraining. Our hypotheses were that adolescents would perceive the second intervention as more autonomy supportive, and that the degree to which they experienced either message as autonomy supportive would be related to their autonomous motivation for not smoking and their behavior of refraining from smoking. The 2 studies herein reported tested the hypotheses using the same measures and comparable presentations in each.

RESULTS

PRELIMINARY STUDY

Methods

Participants were adolescents from 2 large health classes at a suburban high school that met during consecutive

periods (n = 154) who voluntarily completed a questionnaire after being addressed about smoking by a physician on National Smoke Out Day. The 2 classes heard different presentations, as described in the "Materials and Methods" section, so they were not randomly assigned to a presentation. Eighty students received the choice presentation, and 74 students received the demand presentation. The questionnaire included the demographic questions of sex, race, grade level, and family income, as well as smoking status, the adapted TSRQ, and the adapted Health Care Climate Questionnaire.

Results

Sixty-five (42.2%) of the 154 students reported having smoked more than 100 cigarettes in their lives, and thus were classified as smokers according to the National Cancer Institute's definition.² Participants ranged in age from 14 to 18 years (mean, 16.1 years; SD, 0.86 years), 13.0% were minority, and 51.9% were female; the mean household income was \$55 000. There were no statistically significant differences between the 2 groups on any of these variables.

The first regression analysis concerned whether the choice presentation would be perceived as more autonomy supportive by the students. Perceived autonomy supportiveness, assessed immediately after the presentation, was first regressed onto smoking status to control for the effect of smoking, and then onto the type of intervention. After controlling for smoking status, the choice presentation was perceived by the students as significantly more autonomy supportive ($\beta = 0.16$, $F_{1,151} = 4.09$, $P = .04$). Using a parallel analysis, the choice presentation was also marginally predictive of autonomous motivation for not smoking ($\beta = 0.13$, $F_{1,151} = 3.32$, $P = .07$). Finally, autonomous motivation to not smoke was regressed onto perceived autonomy support and smoking status, and autonomy support was found to be significant ($\beta = 0.34$, $F_{1,151} = 27.4$, $P < .001$).

Thus, each of the hypotheses received at least marginal support. These results, along with the α reliabilities for this sample, suggest that the adapted measures were valid.

The primary study was designed to replicate the findings from this preliminary study and to examine the association between autonomous motivation to not smoke and adolescents' self-reported smoking behavior.

PRIMARY STUDY

Methods

All 9th- through 12th-grade students attending a suburban high school in upstate New York were asked to participate in a study regarding adolescent smoking. A cover sheet explaining the study, ensuring confidentiality, and clearly stating the voluntary nature of participating was signed and returned. On the day of the baseline assessment, of the 300 students who were in attendance, 276 provided complete data; 246 subsequently attended a presentation and completed the second questionnaire, and 229 completed the third questionnaire 4 months later. Thus, the sample for various

analyses differed as a function of the number for whom there were complete data at the relevant times.

Five or 6 days before the presentations, students who had agreed to participate completed a baseline (time 1) questionnaire packet that included the demographic information of sex, race, grade level, and father's level of education (intended as a measure of socioeconomic status), as well as their smoking behavior (using 2 items from the Youth Risk Behavior Surveillance System Survey) and the motivation variable of autonomous motivation for not smoking (measured with the adapted TSRQ as in the first study). The smoking behavior items were, "On average over the past 7 days, how many cigarettes did you smoke?" and "On how many of the past 30 days did you smoke cigarettes?" to which students responded on quasi-continuous scales ranging up to "greater than 2 packs per day" and "all 30 days," respectively. The dependent measure of smoking used in this study is the product of the 2 smoking items.

The second (time 2) questionnaire was administered after the presentation and included the students' autonomous reasons for not smoking and their perceptions of the presenter autonomy supportiveness measured on the same scales as in the first study. The third (time 3) questionnaire was administered as a 4-month follow-up and included the 2 smoking behavior questions and the students' autonomous reasons for not smoking.

Design of the Intervention

All students attending gym class 5 or 6 days after completing the baseline questionnaires were randomly assigned, within each gym class, to receive either the self-determination presentation or the more controlling presentation. This randomization was done to maintain the individual subject as the unit of analysis. Each presentation was made several times during a 2-day period to reach all of the students who had agreed to participate. The contents of the presentations were the same as in the preliminary study, except that an additional slide was added to each. In the self-determination presentation, a slide of the Vincent Willem van Gogh painting of a cypress tree was shown, and in the controlling presentation, a slide of the van Gogh painting of a skeleton smoking a cigarette was shown.

Students were separated into 2 groups at the time that attendance was taken, and half were directed to the other half of the gym for their presentation. The 2 presentations and questionnaires were completed simultaneously on opposite sides of a divider, and the 2 groups were dismissed separately. The differing nature of the 2 interventions was not discussed with the students until after the third questionnaire was administered 4 months later, although there is the possibility that students may have discussed the presentations with those who received the other intervention. One presenter was a male physician, and the other a female physician of similar age, and the presentations they made were counterbalanced.

Results

t Tests and χ^2 analyses of data collected at baseline revealed that students' age, sex, race, autonomous motivation for not smoking, and smoking behavior, as well

as father's educational level, were not significantly different between the groups with the choice presentation and the demand presentation, thus confirming that the randomization was effective. These data are presented in **Table 1**. The 2 presenters were not perceived differently for autonomy supportiveness (mean score, 21.5 vs 20.6; $df = 246$; $t = 1.34$; $P = .18$).

The first regression analysis tested whether the choice presentation would be perceived as more autonomy supportive by the students than the demand intervention, after controlling for smoking status. The hypothesis was confirmed ($\beta = 0.34$, $F_{1,239} = 32.5$, $P < .001$).

The second set of analyses tested whether the interventions would differentially affect change in students' autonomous motivation, first from the baseline assessment to the time 2 assessment, and second from the baseline assessment to the 4-month follow-up assessment. Furthermore, these analyses tested whether students' perception of the presenters' autonomy support would relate positively to change during the same 2 periods in the students' autonomous motivation to not smoke. Results of the analyses of data from time 1 to time 2 indicated that, after controlling for whether the students smoked, the intervention did not significantly in-

crease students' autonomous motivation for not smoking ($\beta = -0.02$, $F_{1,194} = 0.28$, $P = .59$), but the students' perceptions of the presenters' autonomy supportiveness did ($\beta = 0.11$, $F_{1,194} = 6.13$, $P = .01$). In addition, again after controlling for whether the students smoked, the intervention did not significantly increase students' autonomous motivation for not smoking from baseline to follow-up ($\beta = 0.02$, $F_{1,153} = 0.11$, $P = .74$), but the students' perception of the presenters' autonomy support did significantly relate to increases in autonomous motivation for not smoking ($\beta = 0.18$, $F_{1,151} = 9.75$, $P = .002$). These results are presented in **Table 2**.

Finally, the third set of analyses concerned the prediction of change in students' self-reported smoking behavior during the 4 months: first, from the intervention; second, from the students' perception of autonomy support; and third, from change in the students' autonomous motivation for not smoking. In the first regression, time 3 smoking was regressed onto time 1 smoking to create change scores, and then onto the intervention and perceived autonomy support. Results showed that the 2 interventions were not differentially related to change in students' smoking ($\beta = 0.04$, $F_{1,176} = 0.01$, $P = .94$), but their perceptions of autonomy support did significantly predict a reduction in smoking ($\beta = -0.12$, $F_{1,175} = 4.09$, $P = .04$). The change in autonomous motivation for not smoking from baseline to time 2 was significantly predictive of reduction in smoking from baseline to follow-up ($\beta = -0.22$, $F_{1,155} = 7.64$, $P = .006$). Also, the change in autonomous motivation for not smoking from baseline to follow-up was significantly predictive of the students' reduction in smoking during that same period ($\beta = -0.26$, $F_{1,188} = 21.3$, $P < .001$). These results appear in **Table 3**.

Thus, the students perceived the choice intervention to be more autonomy supportive than the demand intervention; however, the interventions did not differentially affect change in students' autonomous motivation for not smoking, nor did they differentially affect change in students' self-reported smoking behavior. The students' perception of the presenters' autonomy supportiveness did, however, increase the students' autonomous motivation to not smoke, from baseline to immediately following the presentation and from baseline to follow-up, and it also decreased their self-reported smoking. Finally, the increase in students' autonomous motivation for not smoking also predicted a reduction in smoking.

Table 1. Comparison of Study Variables at Baseline (Time 1) Assessment as a Function of Intervention Condition*

Variable	Intervention		P
	"It's Your Choice" Presentation	"Fear-and-Demand" Presentation	
Female sex, %	57.8	56.1	.81†
Minority, %	15.2	15.3	.99†
Baseline smoking	3.3 ± 7.8	3.5 ± 8.4	.84
Student's grade‡	2.4 ± 1.1	2.4 ± 1.2	.93
Father's educational level§	4.4 ± 1.0	4.6 ± 0.7	.19
Autonomous motivation to not smoke	29.1 ± 7.3	29.1 ± 6.5	.97

*t Tests were used unless otherwise indicated. Values are given as mean ± SD, unless otherwise indicated.

†Value is for the χ^2 statistic.

‡Coded 1 through 4 for all 9th- through 12th-grade students, respectively.

§Coded for 1 through 5, with 1 indicating 9th grade or less; 5, college or higher.

||For a brief explanation, see the text.

Table 2. Multiple Regression Analyses for Change in Autonomous Motivation for Not Smoking

Independent Variables	Autonomous Motivation, β Values	
	Time 2	Time 3
	$F_{3,194} = 108$, $R^2 = 0.63$	$F_{3,153} = 46.7$, $R^2 = 0.48$
Autonomous motivation (time 1)	0.70*	0.66*
Smoking status (0 = no, 1 = yes)	0.16†	-0.08
Intervention (0 = demand, 1 = choice)	-0.02	0.02
	$F_{3,194} = 113$, $R^2 = 0.64$	$F_{3,151} = 54$, $R^2 = 0.52$
Autonomous motivation (time 1)	0.68*	0.63*
Smoking status (0 = no, 1 = yes)	-0.15†	-0.08
Presenter autonomy support	0.11†	0.18†

* $P < .001$.

† $P < .01$.

Table 3. Multiple Regression Analyses for Change in Smoking Behavior

Independent Variables	β Values for Predicting Smoking (Time 3)
	$F_{3,175} = 49.6, R^2 = 45.9$
Smoking (time 1)	0.66*
Intervention (0 = demand, 1 = choice)	0.04
Presenter autonomy support	-0.12†
	$F_{3,155} = 66.3, R^2 = 0.56$
Smoking (time 1)	0.70*
Autonomous motivation	
Time 1	0.12
Time 2	-0.22‡
	$F_{3,188} = 105, R^2 = 0.63$
Smoking (time 1)	0.74*
Autonomous motivation	
Time 1	0.14‡
Time 3	-0.26*

* $P < .001$.

† $P < .05$.

‡ $P < .01$.

COMMENT

The present research tested the self-determination model of health behavior, which suggests that when health-relevant information is presented in an autonomy-supportive manner, the listeners will become more autonomously motivated to accept the message and change their health-relevant behavior. In 2 studies, adolescents heard 1 of 2 presentations about smoking: the first was intended to stimulate fear and to pressure students to not smoke, while the second emphasized that whether students smoke is an important choice for them to make and that there are negative health consequences to smoking. As expected, students experienced the intervention focusing on choice as more autonomy supportive than the one focusing on fear and demand.

The 2 presentations did not, however, have strong differential effects on either change in students' autonomous motivation or change in their smoking behavior. (The intervention was marginally related to autonomous motivation in the first study only.) It is likely that low power due to small sample sizes and the fact that the presentations were done in one short meeting were factors that made it difficult to detect the direct differential effects of the interventions on motivation and behavior.

Additional limitations to the present research include the self-report nature of the students' smoking behavior and the participation rates of about 50% to 65%.

Nevertheless, as hypothesized, students' perceptions of the presenter's autonomy supportiveness were predictive of students' autonomous motivation to not smoke (in the first study) and of change in students' autonomous motivation to not smoke (in the second study). Furthermore, perceived autonomy support and increases in autonomous motivation were predictive of decreases in smoking behav-

ior during the 4 months of the second study. Thus, the effects of the intervention were indirect rather than direct and depended on the teenagers' perceptions of the autonomy supportiveness of the presentations. The present studies also indicate that the measures of autonomous motivation for not smoking and of perceived autonomy supportiveness of the presenters are reliable and valid. Thus, the instruments will be useful for further studies of this sort.

These results provide support for the model in that they emphasize that perceiving a message to be autonomy supportive is important for the message having a positive effect on motivation and behavior. The results further suggest that additional studies with more statistical power and a more extensive intervention would be important to examine the direct differential effects of interventions that emphasize choice vs demand. Such research would help to clarify how best to structure a presentation focused on tobacco self-regulation for adolescents.

Overall, the self-determination model did receive support from the studies, but only indirect effects of the intervention were demonstrated, so additional work is needed to examine more fully the hypothesized direct effects.

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